Effects of in-Vehicle Background Audio on Cognitive Workload During Driving

A Senior Thesis

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Abstract

Drivers routinely perform many additional tasks while driving, such as texting, using navigation systems, etc., that can be distracting and lead to accidents and injuries. According to the National Highway Traffic Safety Administration (NHTSA), distraction can be *visual* (taking one's eyes off the road), *manual* (taking one's hands off the wheel), or *cognitive* (diverting attention from the task of driving). One task that does not meet these surface criteria is listening to music while driving. The impact of background audio on driving has received scant attention in the literature, and results to date are equivocal. Unal et al. (2013) found no effect on driving performance as measured by accuracy in following a lead car, while Brodsky and Slor (2013) reported that younger drivers committed more unsafe driving behaviors in the presence of loud music. It may be that effects of background music are observed only when the driver's cognitive workload is already high, and would not be seen in simple driving maneuvers. The present study addressed this question by evaluating the effects of background music on drivers' performance in a driving simulator while performing simultaneous secondary tasks. Twenty young adults performed an arithmetic task on passing billboards in the driving scenario and also rated the perceived urgency of auditory and visual warning signals presented during the scenario. Half of the participants listened to soft rock music, and half listened to heavy metal music, presented at four different audio levels. Results indicated no impact of music on the billboard arithmetic task, but a systematic underestimation of the urgency of warnings in the heavy metal group. Driving performance analysis showed a slight tendency for increased average speed with increases in sound level. Results suggest that the effects of background audio on driving are subtle, and are manifested in situations where cognitive workload is already high.

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Chapter 1: Introduction and Literature Review

Driving is one of the most common forms of transportation. Most drivers believe that operating a vehicle is second nature; however, driving requires control of many demanding tasks. These tasks include abiding by speed limits, lane keeping, maintaining a safe following distance, and reacting quickly and appropriately to various potential hazards. Driving is one of the most universal and ordinary tasks people perform every day, and possibly the most complex and dangerous (Allen et al., 2010). Hills (1980) describes the task as one requiring continuous monitoring and integration of various perceptual and cognitive inputs. Because driving as a whole is such a complex task, it is important to inspect driving from many angles in order to gain a thorough insight into the intricacy of the task and how it affects performance.

A comprehensive assessment of the driving task was performed by Groeger (2000). In his book, he discusses the aspects of perception, attention, learning, memory, decision making, and motor response that are brought to bear during driving. He notes that because driving is a very recent activity for most humans, at least from an evolutionary perspective, it is not clear how well adapted human sensory and perceptual systems are to the task. Groeger also assesses the interaction of automaticity (the argument that many components of the driving task are performed so often that they become automatic and do not require directed attentional resources) and conscious attention in driving. Although some aspects of driving could be legitimately classified as somewhat automatic, including motor actions such as steering or accelerating, other aspects of the task require a level of conscious monitoring for successful performance. Some of these are described below.

Hills (1980) states that over 90 percent of input information in the driving situation is visual. He further argues that the average driver is often operating at or beyond the limits of his or her visual capabilities, particularly in situations involving passing another vehicle, high-speed maneuvers, poorly-lit roads, or weather-impaired conditions. As a result, drivers often operate from a basis of cognitive expectation- - they behave according to what they predict will happen, when visual information is lacking. For example, the deadly nature of “black ice” arises from the lack of a visual cue about the road conditions, such that drivers expect a dry surface.

Drivers also must constantly anticipate the actions of other drivers. A reasonable expectation in driving is that other drivers will stop at stop lights. Most often, this expectation is upheld. But when another vehicle does not stop, the driver often has little time to alter the trajectory of his or her vehicle. The required cognitive shift from what was expected to what is actually occurring consumes cognitive and attentional resources at a time when directed attention to the task at hand is critical.

Further, the driving task requires constant estimation of the physical aspects of speed and distance, both for the driver’s vehicle and for other cars on the road. One contributor to auto accidents is miscalculation of time to collision, or underestimation of speed of a vehicle. Evans (1991) notes that drivers are notoriously poor at estimating their own speed, and that visual scanning studies reveal that drivers do not frequently look at speedometers (as cited in Groeger, 2000, p. 166). Thus, drivers appear to rely on information in the environment to assess the speed at which their vehicles are traveling. The calculations of trajectory, speed, and distance clearly consume cognitive resources during the driving task.

Many factors contribute to yet another aspect of driver misperception- - the phenomenon often referred to as “look but do not see” (Hills, 1980). In order to see an object in the driving situation, the driver must be awake, aware, and looking in the right direction. Objects must be sufficiently conspicuous to be detected, but even then, attentional demands from other simultaneous tasks can have a substantial effect on whether objects are detected, as well as on how they are perceived and interpreted. Many studies have investigated so-called “situation awareness” and the factors that affect it (see Banbury & Tremblay, 2004 for a summary). Thus, the importance of cognitive workload in driving cannot be overstated.

Numerous researchers have looked at cognitive workload and driving, especially while other tasks are being performed in the vehicle. These other, or secondary, tasks can include listening to music, talking on the phone, eating, or entering a destination into a navigation system. Patten (2007) stated that “Quite often, the secondary tasks will compete for the driver’s available mental resources. This may also occur at a time when the operator or driver’s mental focus is needed to deal with the execution of the primary task. This is when distraction (from the primary task) due to secondary task activities can result in incidents or accidents” (as cited in Alm & Nilsson, 2001). Because distracted driving can result in serious consequences, it is necessary to understand the limits of the driver’s cognitive workload and multitasking abilities while driving.

In just one example of secondary task workload, Patten (2003) investigated mobile phone use while driving. In his study, participants were asked to communicate on two types of mobile phones (hands-free and hand-held), while responding to a light stimulus with the click of a button. Patten’s results showed that as the conversations got more complex, the driver’s reaction time increased. He also found that detection of the light was less accurate during tasks involving the mobile phone, regardless of whether it was hands-free or handheld. He found no correlation between the telephone type (hands-free or handheld) and performance. Subsequent studies have reinforced this conclusion.

The National Highway Traffic Safety Administration (NHTSA) has issued guidelines to automakers for designing in-vehicle secondary tasks to avoid driver distraction (www.distraction.gov). Distraction can be *visual* (i.e., the task takes the driver's eyes off the road), *manual* (i.e., the task takes the driver's hands off the wheel), or *cognitive* (i.e., the task diverts the driver's attention from driving). Texting while driving, they argue, is the most alarming form of distraction, because it involves all three of these factors. The dangers of texting while driving are easy to comprehend and are well documented. NHTSA's definition of distraction also distinguishes distraction from inattention, which can occur because a driver is drowsy, or daydreaming. Distraction, by their definition, occurs when a driver diverts attention from the driving task to perform some other task. In addition, they note that the impact of distraction comes both from the competing task and the frequency with which it is performed. Thus, a task that, if performed once, is not particularly distracting may be classified as distracting if a driver performs that task so frequently that driving is impacted. The effects of distraction can be seen in a wide variety of measures, including reduction in eye scanning behavior, slower reaction times, degraded vehicle control (e.g., lane keeping), and reduced detection of objects in the periphery of the visual field. However, there are potential increases in cognitive workload even when drivers are performing tasks that seem to involve none of these distraction factors.

One example of a secondary task that appears nondistracting by the NHTSA definition is listening to music while driving. Studies to date of the effects of listening to music while driving have offered conflicting results. On one hand, Unal et al. (2013) reported that listening to music had no impact on driving performance as measured by accuracy in following a lead car, regardless of the volume of the music. On the other hand, Brodsky and Slor (2013) found that younger drivers were negatively impacted by the presence of music in the vehicle, committing a number of unsafe driving behaviors. In addition, Brodsky (2001) found a positive correlation between music tempo and driving speed, as well as music tempo and traffic violations (disregarded red traffic-lights, lane crossings, and collisions). He concluded that these driving errors were the result of increased cognitive workload. However, it is possible that any impact on cognitive workload that might be imposed by listening to music while driving would not be observed if the driving task were relatively simple and did not require attention to other factors of the driving situation, as in Unal et al.'s study.

Previous studies have also found differing results on the effects that music has on driver's attention and alertness. These opposing views question whether background audio helps or hinders driving performance in particular circumstances. Cummings (2001) found music to be an effective approach for maintaining alertness while driving drowsy. This conclusion was also found by Reyner and Horne (1998), who found a trend for the radio to reduce automobile incidents while participants performed a driving task with less than five hours of sleep the night before. Reyner and Horne's results considered the radio as a temporary expedient to reduce driver sleepiness, but they found caffeine and naps as even better methods to lessen the feelings of drowsiness. Contradictory to these findings are results provided by Driving Risk Management (2011) that found that regardless of the circumstances, listening to music while driving can divert one's attention from the driving task to a state of active listening. This is where too much of the driver's attention is focused on the background audio. Such a change in attention creates a cognitive distraction and leads to a lack of alertness to the driving situation, that would not provide help even during those drowsy conditions.

One possible negative effect of listening to music while driving that has not received systematic attention is impairment in the ability to detect and process vehicle warnings and notifications, especially when music is played at high levels. It could be asserted that sufficiently loud music in the vehicle might render auditory warnings undetectable. However, some studies suggest that the effect may be more complex than this. Thorslund (2013) reported on cognitive workload in drivers with hearing loss, and found that individuals with hearing loss appear to be much more affected by distractors in the driving situation. This effect is highly correlated with the degree of hearing loss. In baseline driving, without any secondary task performance, Thorslund did not observe any differences in driving performance between normal-hearing subjects and subjects with hearing loss. However, when a secondary task was imposed (reading and repeating letters displayed on a screen in the driver's field of view), hearing-impaired drivers drove more slowly. In addition, they produced more errors on the secondary task. Both of these observations suggest that attentional resources are more greatly taxed in hearing-impaired driving. This conclusion was also reached by Hickson (2010), who observed that older adults with moderate to severe hearing impairment exhibited significantly poorer driving performance in the presence of distracters, as compared to individuals with normal hearing or only a mild hearing impairment.

By analogy, a situation in which loud music occupies auditory capacity could also tax attentional resources in a manner analogous to that for a hearing-impaired driver. A study conducted by the RAC Foundation in Britain reported that drivers were twice as likely to run a red light while listening to music, compared to a condition with no background audio. Further, the Foundation argued that the tempo of background music can also contribute to a higher accident rate. They suggested that the increase in accidents with up-tempo music could be attributed to an increase in heart rate and blood pressure in drivers. Smith and Morris (1977), in evaluating the impact of background audio on other cognitive tasks, found that performance was highest in a no-audio condition, intermediate when participants listened to “sedative” music, and poorest when participants listened to “stimulating” music. This result suggests that the type of music in the audio presentation could have a substantial impact on cognitive workload in the driving task as well. Finally, a number of studies have shown that performance on cognitive tasks is negatively impacted by the level of background audio, with performance decreasing as sound level increases.

The increase in cognitive workload associated with greater difficulty in detecting warnings, together with music-induced cognitive workload increases that might not be observable under normal driving situations, might combine to create a threat to the safety of the driver. The present study addressed the question of whether, and how, the presence of background music while driving affects performance when drivers are asked to drive the vehicle, detect vehicle warnings, and monitor other aspects of the driving situation simultaneously. For the present study, each participant was asked to drive at a constant rate of 60 mph, throughout the entire experiment. During their drive, they were asked to detect and rate warning signals played at random intervals on a scale of one to five, (one representing low urgency and five representing high urgency). Once this task was completed, the subjects were required to perform basic arithmetic on billboards occurring at intervals. It was hypothesized that some aspects of driving behavior, including maintaining a constant speed, or lane keeping, would be negatively impacted as levels of background audio increased. In addition, judgements of the urgency of warnings, as well as performance on the billboard addition task should also be affected by the level of background audio. Furthermore, based on the results of Smith and Morris (1977), it was anticipated that performance would be poorer for subjects who listened to “hard rock” rather than “soft rock” background audio.

Chapter 2: Methods

Participants

This study was approved by The Ohio State University Institutional Review Board, IRB Protocol number 2013B0050. There were twenty participants in this study, all of whom hold valid driver’s licenses. The participants were ten men and ten women between the ages 18 and 30. All participants received $40 as compensation for their time. The participants were recruited via word of mouth. All reported normal hearing and normal or corrected-to-normal vision.

Simulator Equipment and Stimuli

A Realtime Technologies Inc. (RTI) driving simulator was used for this experiment. This simulator includes a 2010 Honda Accord cab mounted on a motion-base platform, with five cylindrical projection screens wrapping around the vehicle at 260°/field of view. Five projectors provide a seamless visual representation of the driving scenario. A rearview screen provides rearview information, in addition to two LCD screens mounted in the side mirrors. The motion-base platform moves in six degrees of motion, making the simulated drive feel very similar to a real vehicle's movements. The simulated scenario was created using the program SimCreator by RTI. The scenario imitated a two lane highway with a relatively high level of traffic. Forty two billboards were added into the scenario, placed at every half mile.

All of the billboards were presented on the right side of the road, with a different number displayed on each of them. Four video cameras were mounted to the interior of the vehicle, to capture both the participant and the simulated scenario. The interior of the car is that of a Honda Accord, and includes a gas pedal, a brake pedal, a shifter knob, a turn signal, and a steering wheel. A speedometer was presented on the front projection screen for the participant's use. External audio speakers were mounted on the cylindrical screen and provided audio cues about the vehicle's motion (acceleration, wind noise, etc.). Music was presented via the vehicle's audio system and speakers.

Fifteen warning signals were presented during experimentation. These signals included multiple visual warnings and multiple auditory warnings. The visual warnings were squares displayed on the vehicle's dashboard, and varied in color (red/yellow), size (.8125 in^2 or 1.5625 in^2), and duration of illumination (1,000 ms, 2,000 ms, or repeating). Auditory warnings (1,000 Hz tones) were played through the vehicle's audio system and varied in duration of sound (500 ms, 1,000 ms, or repeating), and level (55 dBA or 65 dBA). Table 1 shows the characteristics of each warning signal. Signals were chosen from a set previously used in the laboratory for another study, and were known to vary in perceived urgency.

Background audio consisted of a fixed playlist of songs presented via the vehicle's audio system. The music played during the tasks was presented at 4 audio levels: no music, low (60 dBA), medium (66 dBA), and high (76 dBA). Level measurements were made with a sound level meter, placed at the approximate position on the driver's head. The first ten participants listened to soft rock/alternative music, while the last ten participants listened to hard rock/screamo music. Specific music playlists are included in the Appendix.

Procedure

Each participant was required to sign a consent form before the experimentation began. Once this was completed, the participant was instructed to get into the driver's seat of the simulated vehicle. A moderator was with the participant at all times to provide instructions for the procedure. Assistants in the lab's control room were in charge of starting up the simulator and controlling the lights. Once the participant was comfortable in the driver's seat, he/she was asked to practice driving for approximately five minutes. This gave the participant's time to get acclimated to the simulator's dynamics and differences from their own vehicles.

After completion of the practice drive, the participant was instructed to pull over onto the right shoulder of the road for a brief overview of the study. For the first portion of the experiment, the participant was instructed to rate the perceived urgency of each warning signals played through the car's audio system on a scale of 1-5, one being the least urgent, and five being the most urgent. Participants were instructed to base responses on the size, color, sound, shape and sound of the warning. Sample warnings were played to show the participants what they were expected to do. The participants were then instructed to merge back onto the highway and drive at 60 mph. Participants were repeatedly asked to drive at 60 mph throughout the entire experiment. This was to measure their ability to follow instructions while preforming tasks in the vehicle. After the participant reached a speed of 60 mph, the warning signals were played concurrently with music in the car. Music levels (no, low, medium, and high) were presented in a random order. The participant's answers were recorded into an Excel document by the research assistants in the control room.

Once all of the warning signals were presented at every audio level, the moderator instructed the participant to pull over into the right shoulder again, to provide instructions for the billboard portion of the experiment. The participant was instructed to add a number to the number displayed on each passing billboard. The moderator provided a different number for each billboard (2, 5, 6 or 11). This was not to test the participant's arithmetic, but only used to test cognitive workload and multitasking abilities while driving and listening to music in the vehicle.

A post-experiment questionnaire was administered after completion of the billboard task. Participants were instructed to pull over to the shoulder and put the car in park, ending the driving scenario. Each subject was asked the following questions:

1. Do you typically listen to music while driving?
2. What types of music do you listen to?
3. Do you typically listen to music while studying?
4. What was your perceived level of difficulty while performing today's tasks?

The results from the post-experiment questionnaire were further analyzed in the results and discussion section.

Chapter 3: Results and Discussion

Results were analyzed to assess overall effects of the independent variables (music type and level) on several dependent variables (measures of driving performance, perceived urgency of warnings, and billboard accuracy). All analyses were performed with an alpha level of .05. Verbal dependent variables are discussed first in this section, followed by driving variables.

Warning Urgency Ratings

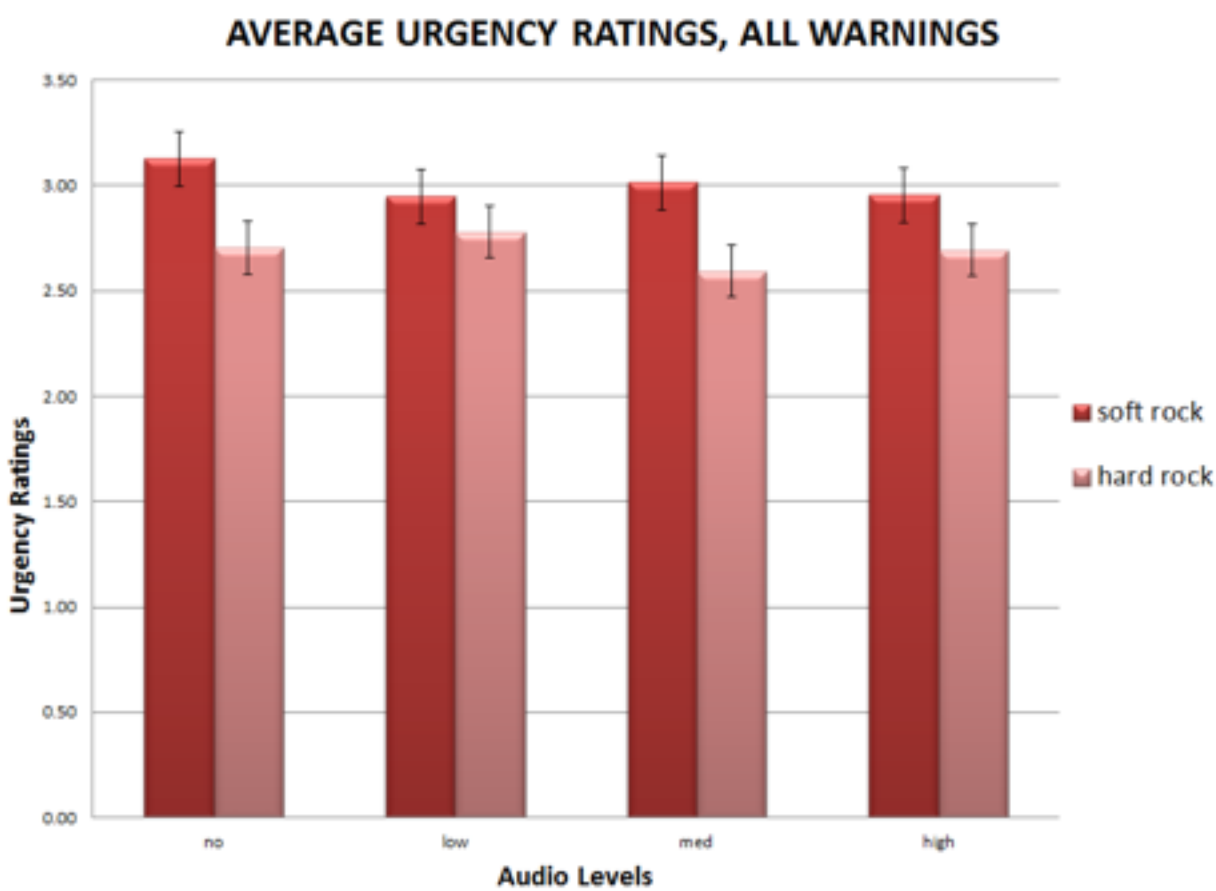

Figure 1. Average urgency ratings for all warnings, as a function of music type and level.

Figure 1 shows averaged perceived urgency of warnings as a function of background audio type and sound level. Perceived urgency ratings for the hard rock group are slightly lower than those for the soft rock group. In addition, overall warning urgency decreases as sound level increases. A mixed design analysis of variance (ANOVA) was performed to determine if level or type of music affected perceived warning urgency. This analysis used type of music (soft/hard) as a between subjects factor, and sound level and warning signal as repeated measures. The analysis showed a borderline effect of sound type, $F(1, 16) = 3.76$, $p = .07$. This indicates a trend towards underestimating the urgency of warnings in the hard rock group, which did not quite reach statistical significance.

In addition, a significant effect of background audio was found, $F(3, 48) = 3.021$, $p = .039$, indicating that the perceived urgency of warnings did decrease at higher sound levels.

As expected, a significant effect of warning signal was also found, $F(14, 224) = 88.48$, $p < .001$. This is not surprising, since the warnings were deliberately chosen to vary in perceived urgency based on previous findings in the lab.

No significant interactions were found (level x type, level x warning, type x warning, or level x type x warning).

<u>Billboard Arithmetic</u>

The data for the billboard arithmetic task showed high levels of accuracy for all subjects under all conditions. So few errors were observed that no statistical analysis of the data was performed. Possible reasons for the high accuracy levels are discussed later.

Average Speed

In the present study, all of the participants were instructed to maintain a constant speed of 60 mph. Figure 2 shows average speed across all background audio levels for soft and heard rock groups. These data show a trend towards higher average speed at higher audio levels.

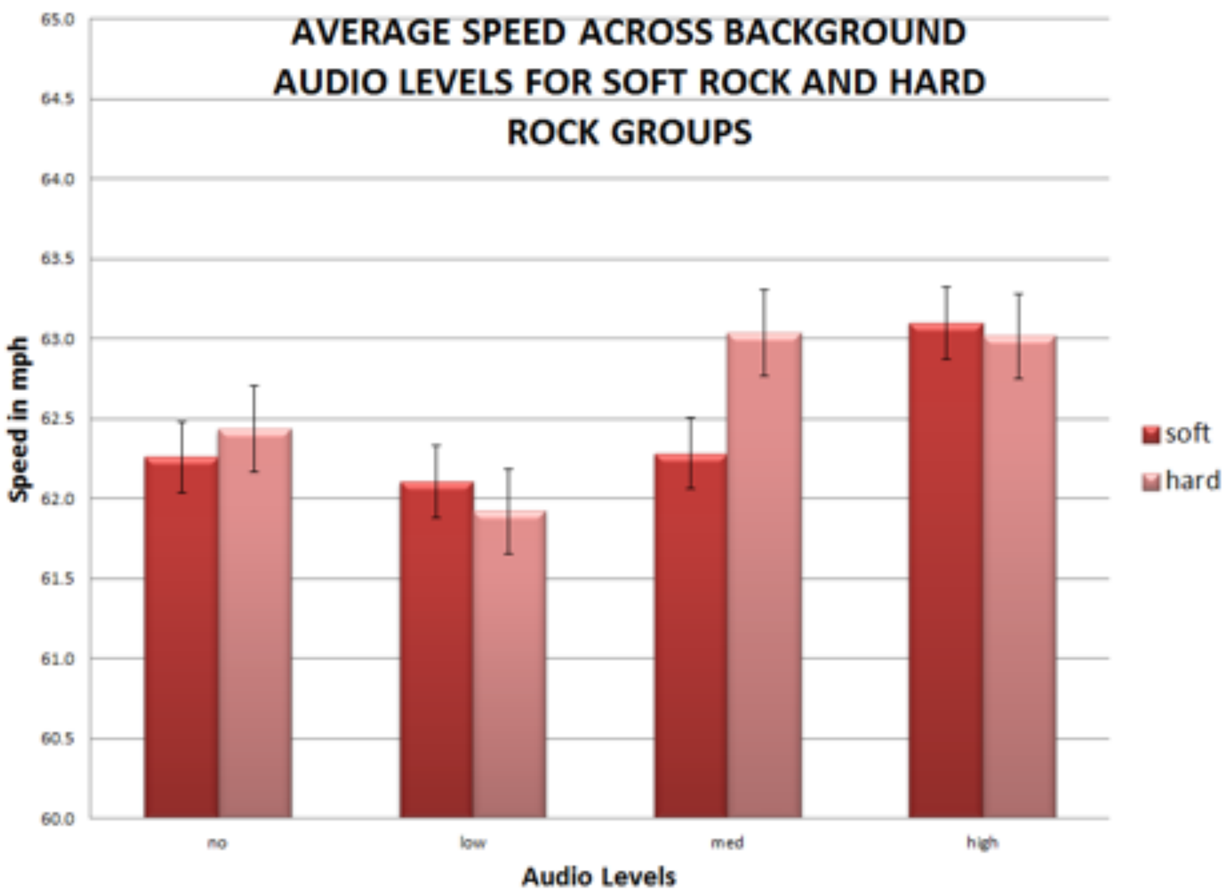

Figure 2. Average speed across background audio levels for soft and hard rock groups.

A mixed model ANOVA was used to access the significance of any trends in the data. This analysis used type of music as a between subjects factor and music level as a repeated measure. Results showed no significant effect of type of music, $F(1, 9) = .044$, n.s. However, a significant effect of music level was observed $F(3, 9) = 4.99$, $p= .005$. Partial eta^2 for this effect shows 68% of total variance accounted for by music level. This effect shows a slight, but statistical significant increase in average speed with increasing sound level. No significant interaction was observed.

Safe Following Distance

Safe following distance was analyzed by determining the percentage of the time that the driver maintained at least a 3 second following interval behind the car in front of them. This criterion is used by NHTSA, as an indicator of safe following (www.distraction.gov). Inspection of data showed some instances of unsafe following, but these instances showed no consistent pattern, and thus no additional analysis was performed.

Lane Keeping

Inspection of data on lane keeping showed very few instances of drivers straying outside of their lane. These data were further evaluated to obtain estimates of the variability of vehicle position within the lane. Lateral displacement velocity relative to the driver's average center point in the lane is shown in Figure 3, averaged across subjects. Any differences across levels and music types did not reach statistical significance.

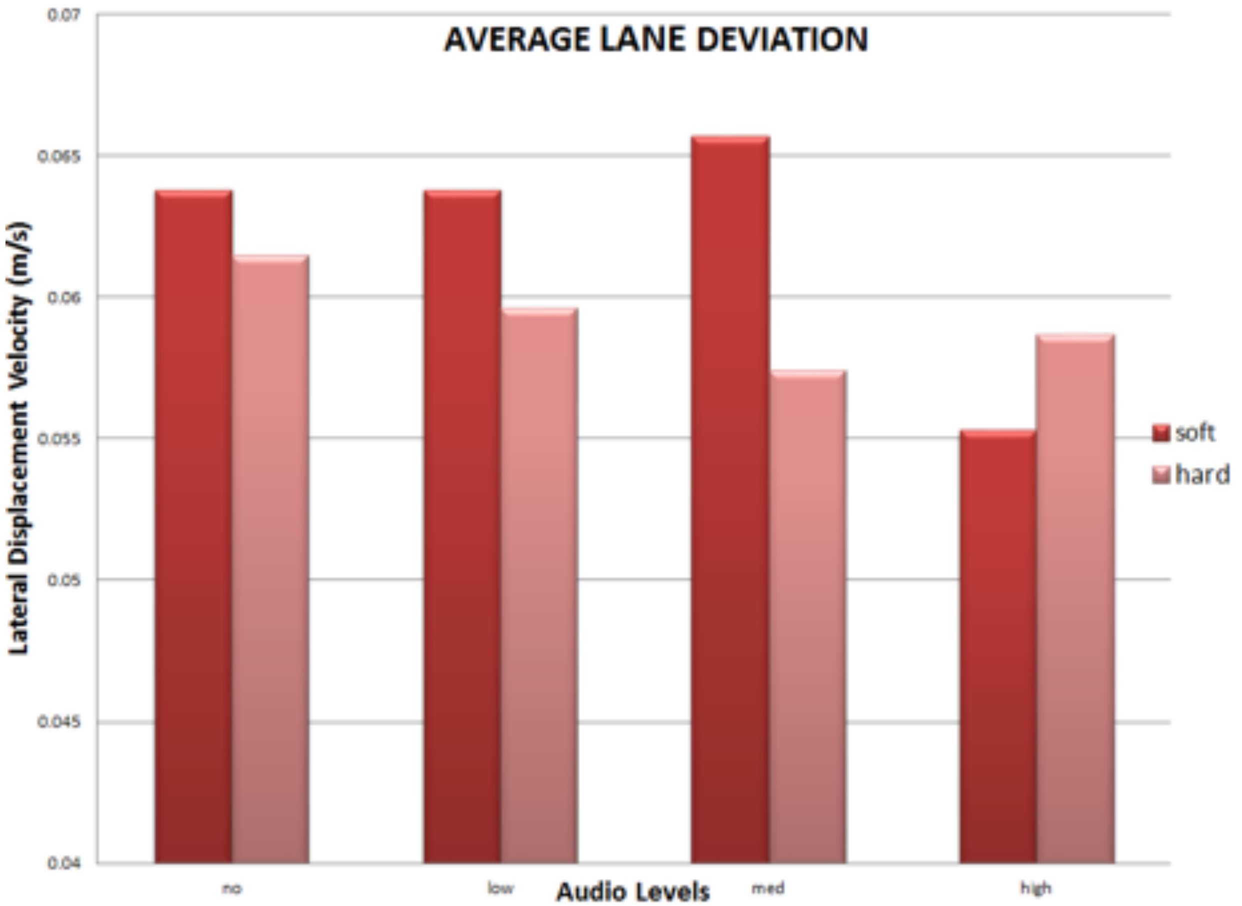

Figure 3. Average Lane Deviation as a function of music type and level.

Discussion

Warning Urgency:

The significant effects of background audio level and music type on the estimated urgency of warnings suggest that background audio may affect cognitive workload and attention allocation when such signals are presented. This consideration is important for designers of in-vehicle warning indicators, who must ensure that a warning's urgency is appropriately judged to prevent vehicle accidents. Further studies could test warning signals of different sizes and a variety of colors to make a clearer distinction between perceived urgency ratings in the absence of background audio, such that the impact of background audio might be more easily observed.

Billboards:

The billboard task was performed to measure situational awareness in the vehicle. According to our results, the situational awareness of these participants was quite high, making the results nearly perfect under all circumstances. The lack of effect on the billboard arithmetic task may signify that the task was too easy; the billboards were evenly spaced, all placed in the same location, and not sufficiently frequent to impose substantial workload on the driver. Further studies employing tasks that more effectively engage driver attention and increase cognitive workload may yield different results.

Music Level:

In the present study, the highest background audio level, 76 dBA, was chosen to eliminate the possibility of inducing any temporary threshold shift from noise exposure. However, previous studies indicate that many people routinely listen to music levels far greater than 76 dBA while driving, and the small size of effects observed here might not reflect the true impact of background audio on the driving task. Future work might explore how to simulate actual listening behavior more realistically. Because the duration of the exposure in the present study was only one hour, higher audio levels could most likely be presented safely.

Questionnaire Responses:

The questionnaire responses gave insight into the typical routines of young adult drivers. Approximately 95 percent of the participants reported that they listen to music while driving, with a wide variability in preferred genre. Nearly 45 percent answered yes to listening to music while studying. This question was used to assess how often these participants listen to music while performing other tasks. Lastly, when asked about perceived level of difficulty of the tasks in the present study, 40 percent of participants responded with easy, 50 percent said moderate, and 10 percent stated that the tasks were difficult. There were no observed differences between the answers of the soft rock participants and hard rock participants.

Chapter 4: Summary and Conclusion

Overall, the results of the present study show some effect of background audio on cognitive workload while driving. This effect was observed through analyzing perceived urgency of warnings and by measuring driving performance. As the results show, there was a slight decrease in perceived urgency of warnings in the hard rock group and a significant effect of sound level on rated urgency. In addition, there was a slight increase in average speed as the music level increased. These effects were subtle, however, and may only manifest when tasks such as driving are difficult. Because the driving task employed in the present study was rather simple, it is likely that larger effects could be observed in studies with more difficult driving tasks.

The effect that background audio has on cognitive workload and driving performance may be comparable to the effect that hearing loss has on driving performance in hearing impaired individuals. Past studies have shown that attentional resources are more greatly taxed in hearing-impaired driving, and therefore, these drivers appear to have poorer driving performance, especially when performing secondary tasks. This may be the same kind of phenomenon that happens when loud music occupies auditory capacity. As the present study found, an increase in cognitive workload due to high levels of auditory stimulus slightly hinders a person with normal hearing's ability to drive well and maintain speed. It also affects their ability to perform any secondary tasks, like rating the urgency of warnings, for example.

Because many drivers operate with high levels of background audio and perform many secondary tasks, automobile designers need to be aware of this effect, and design in-vehicle warning signals accordingly. These in-vehicle warning designers must be mindful that listening to music is a very common activity that most people perform while driving. With appropriately designed vehicle warning signals, drivers will be more likely to react safely to their vehicles, even while listening to music.

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Chapter 6: Table 1

Table 1

Characteristics of Warnings

Visual				Auditory		
Signal	**Color**	**Size**	**Duration**	**Volume**	**Duration**	**Expected Urgency**
1	Yellow	.8125 in	1000ms	55dB	500ms	2.5
2	Yellow	.8125 in	1000ms	55dB	1000ms	1.5
3	Yellow	.8125 in	1000ms	55dB	Repeating	1.75
4	Yellow	.8125 in	2000ms	55dB	500ms	1.5
5	Red	.8125 in	1000ms	65dB	Repeating	2.75
6	Yellow	.8125 in	Repeating	55dB	500ms	2
7	Yellow	1.5625 in	Repeating	55dB	500ms	3
8	Yellow	1.5625 in	Repeating	55dB	1000ms	2.75
9	Yellow	1.5625 in	2000ms	55dB	Repeating	3
10	Yellow	1.5625 in	Repeating	55dB	500ms	2.5
11	Yellow	1.5625 in	Repeating	55dB	500ms	2.5
12	Red	1.5625 in	Repeating	65dB	Repeating	3.75
13	Yellow	1.5625 in	1000ms	55dB	500ms	2.5
14	Red	1.5625 in	Repeating	65dB	500ms	3.5
15	Red	1.5625 in	2000ms	65dB	1000ms	3.5

Chapter 7: Appendix

Song Title	Artist	Genre	Played for:
Viva La Vida	Coldplay	Soft Rock/Alternative	Participants 1-10
Chasing Cars	Snow Patrol	Soft Rock/Alternative	Participants 1-10
Daughters	John Mayer	Soft Rock/Alternative	Participants 1-10
The Reason	Hoobastank	Soft Rock/Alternative	Participants 1-10
Waiting on the World to Change	John Mayer	Soft Rock/Alternative	Participants 1-10
So Contagious	Acceptance	Soft Rock/Alternative	Participants 1-10
Speed of Sound	Coldplay	Soft Rock/Alternative	Participants 1-10
Good Life	Coldplay	Soft Rock/Alternative	Participants 1-10
Push	Matchbox Twenty	Soft Rock/Alternative	Participants 1-10
Over My Head (Cable Car)	The Fray	Soft Rock/Alternative	Participants 1-10
The Remedy (I Won't Worry)	Jason Mraz	Soft Rock/Alternative	Participants 1-10
The Plot to Bomb The Panhandle	A Day to Remember	Hard Rock	Participants 11-20
The Diary of Jane	Breaking Benjamin	Hard Rock	Participants 11-20
The Arms of Sorrow	Killswitch Engage	Hard Rock	Participants 11-20
Tears Don't Fall	Bullet For My Valentine	Hard Rock	Participants 11-20
The Downfall of Us All	A Day to Remember	Hard Rock	Participants 11-20

Still Fly	The Devil Wears Prada	Hard Rock	Participants 11-20
Faces	Scary Kids Scaring Kids	Hard Rock	Participants 11-20
The Theft	Atreyu	Hard Rock	Participants 11-20
The Final Episode (Let's Change Channel)	Asking Alexandria	Hard Rock	Participants 11-20
Hey Mister	Miss May I	Hard Rock	Participants 11-20